



ZMF100a™ Installation Guide

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INTRODUCTION

The ZMF100a™ is a modification "kit" which includes all that is needed to modify an "old" motherboard Z-100™ computer so that one, two or three sets (nine chips per set) of industry- standard 256K memory chips may be installed directly on the motherboard in place of 64K memory chips. No 64K chips may be installed. This permits up to 768K bytes of memory to be installed without using an S100 bus card slot.

Included in the ZMF100a™ package is an assembled circuit board and a bus bar. The circuit board plugs into mother board in place of two chips which are plugged into sockets on the circuit board. The bus bar plugs into pin-1 of each memory chip socket and is connected to the circuit board by a short, plug-in cable.

The pin-1's of the memory chips must be connected together because 256K memory chips need two more address bits than 64K chips. The two new address bits are multiplexed and connected to pin-1 of the 256K chips. Pin-1 isn't used by 64K memory chips.

HOW IT WORKS

The ZMF100a™ circuit board alters the wiring to the existing high address decoder PAL (U173) and memory mapping PROM (U111) so that 768K of motherboard memory is enabled and 256K memory banks are decoded instead of 64K banks.

Address bits 16 and 17 are multiplexed by a special PAL (U1) on the ZMF100A circuit board and output to the memory chip pin-1's via a cable and the bus bar. This PAL also handles the address rearrangements required by the Z-100™ "bank swapping" Memory Maps 1, 2, and 3 which are used by some 8-bit operating systems such as Watzman's CP/M™ -Plus.

With the ZMF100a™ installed, memory installed on the S-100 bus in the address range of 3000:0000 through B000:FFFF can no longer be accessed. This is because all of this memory is now "on the motherboard." This is true regardless of how many banks of 256K memory

chips installed. However, a simple jumper change (see S-100 BUS MEMORY ACCESS) on the ZMF100A circuit board will allow access to memory on the S100 bus.

INSTALLATION

The ZMF100a™ works only on a motherboard with a circuit board part number of 85-2653-1. This motherboard will have an assembly part number of less than 181-4918. Check the part number before starting the installation.

The Z-100™ motherboard has two part numbers. The circuit board part number is screen printed on the motherboard near IC U173. You must partially remove the video logic board in order to see it. The assembly part number is printed on a paper sticker attached (usually) to J2, inside of the back panel. Only the computer's cover need be removed in order to see it.

Installation of the ZMF100a™ package consists of installing the bus bar, one, two or three banks of 256K memory chips, and plugging in the ZMF100A circuit board. The installation procedure is relatively simple but there is a small element of risk of damage to the computer involved. Before you start the installation, please read over the entire procedure. If you do not feel confident that you can perform the installation safely or are unwilling to accept the risks, please return your ZMF100a™ package to your dealer for a refund.

INITIAL DISASSEMBLY

Initially, the disassembly procedure used depends on which model of computer that you have. Follow the step-by-step procedure applicable to your model.

ALL-IN-ONE INITIAL DISASSEMBLY

1. Unplug the Z-100™ line cord from the AC outlet.
2. Remove the cabinet top as shown in the Zenith manual.
3. Remove the rear screw of each cover latching slide.
4. Pivot each slide outward.
5. Remove the five screws which hold the drive/video sub assembly to the to the base assembly.
6. Carefully lift the drive/video subassembly up and to the front of the computer about 4 or 5 inches and set it back down.

7. Unplug the cable from the video deflection board.
8. Unplug the disk controller cable from the H/Z207 board.
9. Unplug the power cable from each disk drive.
10. Remove the drive/video subassembly and set it aside.
11. Proceed to **FINAL DISASSEMBLY**.

LOW-PROFILE INITIAL DISASSEMBLY

1. Unplug the Z-100™ line cord from the AC outlet.
2. Remove the cabinet top as shown in the Zenith manual.
3. Remove the four screws and two locking pins that hold the drive subassembly to the base assembly.
4. Carefully lift the drive subassembly up and to the front of the computer about 2 inches and set it down.
5. Unplug the disk controller and power cable from each disk drive.
6. Remove the drive subassembly and set it aside.
7. Remove the two remaining locking pins.
8. Proceed to **FINAL DISASSEMBLY**.

FINAL DISASSEMBLY

1. Remove the lower cabinet shell and set it aside.
2. Lift the keyboard up and move it forward to expose the keyboard connectors on the motherboard. Carefully unplug these connectors and set the keyboard aside.
3. Remove the three screws that hold the video logic board in place.
4. Pivot the video logic board up and towards the back and leave it leaning on the cardfile.
5. Remove all of the 64K memory chips from the memory array (U101-U109, U117-U125, and U137-U145) and set them aside. Wrap the chips in aluminum foil or plug them into conductive foam to protect them against static electricity.

MEMORY ARRAY MODIFICATION

Carefully examine the bus bar. Make sure that all of its pins are straight and bent at right angles to the surface of the bus bar. If any pins are improperly bent, carefully adjust them.

Position the bus bar over the memory chip sockets with its pins pointing downward. The "cable corner" of the bus bar should be near U109 (see photo). Align the bus bar (bend if necessary) so that a pin falls into the pin-1 entry of each socket. Pin-1 is identified by a small "1" printed on the motherboard near the socket entry.

Start at U109 and, using the eraser-end of a pencil, "tap" the bus bar pins into the sockets, one at a time. Tap each pin with a quick, straight-down stroke of moderate force. As the pins are pushed in, the bus bar will twist slightly so line up each pin carefully before tapping it in. Work from the long edge of the bus bar out each three-pin "branch" and towards the front of the computer until all pins have been inserted (finish at U137).

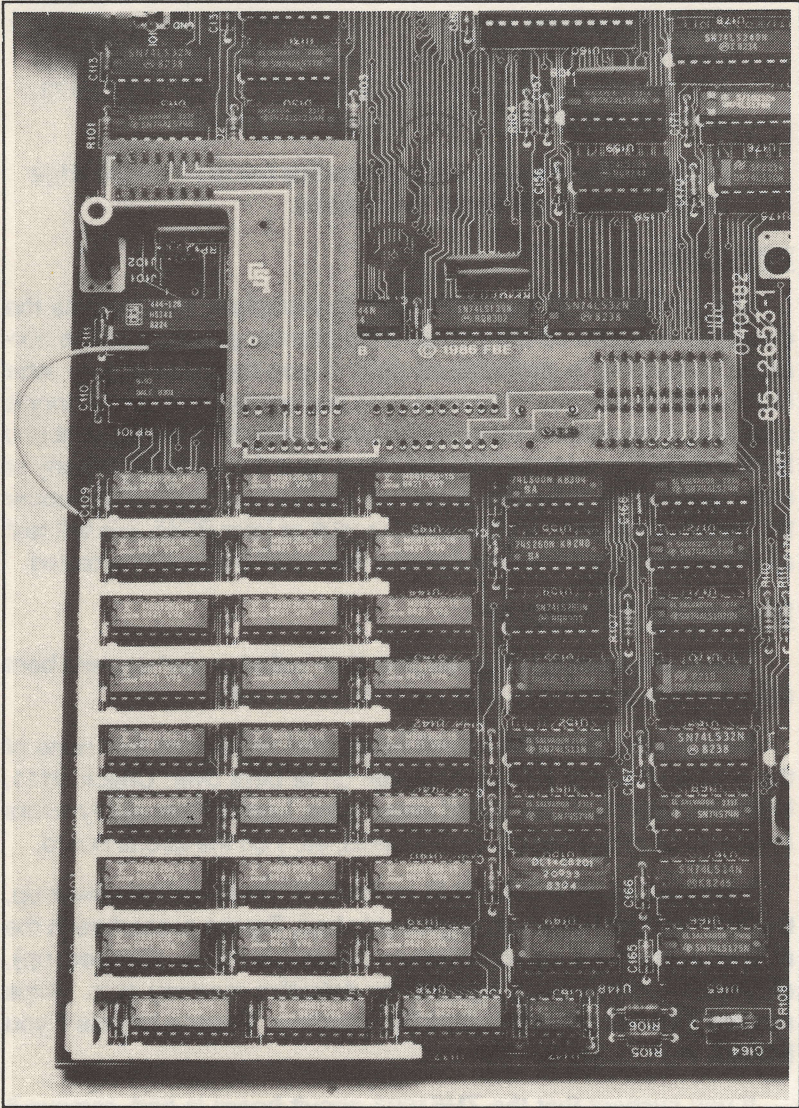
Note: When handling the memory chips, take caution against static electricity. Handle the chips as little as possible once they are removed from their protective packaging. If possible, keep part of your body in contact with the metal portion of the computer chassis while installing the chips.

Install the 256K RAM chips in the sockets. The first "bank" installs at U101-U109, the second at U117-U125, and the third at U137-U145. As you install the chips, make sure that the pin-1 end of the chip (identified by a "notch" or "dot" on the top of the IC) is oriented towards the pin-1 mark on the motherboard and that none of the IC pins "roll under" or bend out.

After installation of the memory chips, inspect each pin-1 and make sure that the bus bar is in contact only with pin-1 and is not accidentally touching a pin-2. If it is, push it away from pin-2.

CIRCUIT BOARD INSTALLATION

1. Locate and remove the IC at location U173.
2. Plug this IC into the socket labeled U173 on the ZMF100A circuit board. Make sure that the pin-1 end of the IC (identified by a "notch," "dot," or "stripe" on one end of the IC) is oriented towards the "dot" printed on the circuit board.
3. Locate and remove the IC at location U111.



The ZMF100A and Bus Bar Installed

4. Plug this IC into the socket labeled U111 on the ZMF100A circuit board. Be sure that pin-1 end of the IC is oriented towards the "dot" on the circuit board.
5. Position the ZMF100A circuit board so that the pins of P111 and P173 face downwards with P111 towards the rear of the computer (see photo).

6. Carefully align the pins of P111 and P173 with the sockets at U111 and U173 on the motherboard. Press firmly downwards, applying pressure directly above P111/U111 and P173/U173, until the pins of P111 and P173 are fully inserted.
7. Connect the cable coming from the bus bar to P1 on the edge of ZMF100A circuit board (see photo).

FINAL TESTS

The installation of the ZMF100a™ is complete. Reassemble the computer and turn on the power. If the Monitor program beeps normally, everything is probably all right. If you have the v2.5 or later Monitor ROM, use the 'S' command to find out how much memory is available. If the amount indicated is less memory than the amount you have installed, a memory chip may have been installed improperly or may be defective. If the size is correct, run the memory test (it's under the TEST command). If you have the v2.9 or later ROM, this will test all of the memory otherwise only the first 192K bytes will be tested.

IN CASE OF DIFFICULTY

Check the memory chips for pins that "rolled under" or were bent out when the chips were plugged into the sockets.

Remove the ZMF100A circuit board and make sure that none of the pins on P111 or P173 are broken off or bent over. Check U111, U173, and (even) U1 for "rolled under" pins. Look for assembly errors (unsoldered pins, missing components, etc.) on the circuit board.

If you get an "ERROR - BUS or PARITY" message on power-up, the ZMF100A circuit board is probably bad. Try the procedure in the next paragraph. If the error message occurs later (e.g., after boot up), check for an improperly installed or defective memory chip. Chips marked AT&T or WE can cause this problem. Change brands if you have them.

If you suspect that the ZMF100A circuit board is bad, remove it from the computer, remove the chips from U111 and U173 and reinstall them in the motherboard. Do not remove the 256K RAM chips. Temporarily connect the cable coming from the bus bar to chassis ground. This will cause the 256K RAM chips to behave as if they were 64K RAM chips. Reassemble the computer and power up. If all works properly, then the ZMF100A circuit board should be returned to your dealer for repair or replacement. If there is still trouble, then you must look elsewhere for the cause.

If you get a memory error message when running the Monitor program memory test, you may have to interpret the message to determine which bank of chips has the problem. This is because the test assumes that you have 64K RAM chips installed. Use the bank number given in the message to identify which 256K bank has the problem. Banks 0 - 3 are in U101-U109, banks 4 - 7 are in U117-U125, and banks 8 - 11 are in U137-U145. Check the chips installed in the affected bank for "rolled under" or bent out pins.

For technical assistance, call 206-246-9815 between 1 and 5 PM Pacific Time. Our mailing address is FBE Research Company, Inc., 11648 Military Road South, Seattle, Washington 98168. Please call or write for authorization before returning any items.

MEMORY TESTING

Memory chips are very reliable and testing is not essential but if you must then the best way is to run the RAM DIAGNOSTIC tests of the "H/Z-100 Series Disk-Based Diagnostics" program. This program is available from the Heath Company as part number CB-463-13. Before running the RAM DIAGNOSTIC tests, configure the program for the proper memory size in 64K banks (0-3, 0-7, or 0-11 for 256K, 512K, or 768K) and type of memory chips (256K) by selecting the MISC. FUNCTION item from the main program menu. All of the RAM DIAGNOSTIC tests will work.

If have the "old" version of this program, you will not be able to select the memory chip type. The program assumes that 64K chips are installed. If this is the case, the PARITY GENERATOR/CHECKER test will not work.

S-100 BUS MEMORY ACCESS

Memory in the address range of 8000:0000 through B000:FFFF (that is, 256K bytes starting at 512K) installed on the S-100 bus may be accessed with the ZMF100a™ installed only if a jumper is changed on the ZMF100A circuit board.

Note: Don't do this unless you have a memory card which you wish to install on the S-100 bus starting at address 8000:0000.

Near the label "U173" on the component side of the ZMF100A circuit board there are three "pads" in a row. On the other side of the board, the middle pad is connected to an outside pad by a trace. To enable S-100 bus memory access, cut this trace and install a jumper between the middle pad and the previously unconnected outside pad.

WARRANTY

FBE Research Company, Inc. warrants to the original purchaser of a ZMF100a™ package that, for a period of 180 days from the date of purchase from FBE Research Company, Inc. or an Authorized Dealer, the ZMF100A circuit board and bus bar shall be free of defects in material and workmanship under normal conditions of use and service. During this period, if a defect should occur, the ZMF100A circuit board or bus bar may be returned with prior approval to FBE Research Company, Inc. for repair or replacement, at our option. No statements regarding the performance or suitability for use of ZMF100a™ package shall be considered part of this warranty. This warranty becomes null and void if the ZMF100A circuit board or bus bar is misused, neglected, altered, or otherwise abused. There are no other warranties express or implied.

LIABILITY

FBE Research Company, Inc. accepts no responsibility, obligation, or liability for damages including but not limited to loss of profits or benefits arising from or consequential to the installation, use or misuse of the ZMF100a™ package.

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